

DA 101			STATE OF LOUISIANA			
THIS IS NOT AN ORDER!!!!!!						
REQUEST FOR PRICES ONLY!!!!!!						
			BID MUST BE RECEIVED BY:			
Date	Desired Delivery Date	F.O.B.	Thursday May 08, 2009 Before 2:00PM		Bid No.	
04/02/09	ASAP	Lafayette CAMPUS SITE			09-055	
VENDOR NAME AND ADDRESS			SHIP TO ADDRESS: South Louisiana Community College 320 Devalcourt St. Lafayette, LA 70506 Phone: 337-521-8896			
			MAIL SIGNED BID TO: James Altman Phone: 337-521-8897 South Louisiana Community College 320 Devalcourt St. Lafayette, LA 70506 Email: james.altman@southlouisiana.edu			
ITEM	DESCRIPTION		QUANTITY	UNIT	UNIT PR	AMOUNT
1	SLCC is soliciting sealed bids for the following attached scope of work. The target work completion date is NLT June 15, 2009 and as soon as possible after authorization to proceed. The successful bidder will be responsible for a turnkey job to include, but not limited to, the proper and complete solicitation and receipt of all city, parish, and state (construction, environmental, etc.) permits (as required), providing project management, supervision, liaison to SLCC, qualified personnel and proper equipment to safely, successfully, completely and expeditiously perform this scope of work		1	JOB		
	A one-time mandatory pre-bid meeting will be held for all bidders. This pre-bid meeting is a requirement for bid consideration. The pre-bid meeting will occur on site at 320 Devalcourt St. (Rm. 123) Lafayette, LA on Tuesday April 28, 2009 at 09:00AM and will be presented by SLCC Facilities Coordinator, Ed Lopez. Bid award shall be based on the total sum of the construction cost and contingency fee. Requested and approved change requests will be required to access the contingency fee funds. During this meeting a review of the scope, followed by a question and answer session, will take place. Bidders will then be shown the area of construction. Additional information, if applicable, will be distributed at this time. A site visit (documented by sign-in) is required of all bidders.					
	"SIGNATURE REQUIRED" WHEN BIDDING ON OTHER THAN "AS SPECIFIED" PLEASE INCLUDE MANUFACTURER'S LITERATURE ****Please Read Below ****					
FILE NUMBER* BUYER ** **	Louisiana State Sales Tax not to be included in above price or added to the invoice. Price assumed firm unless otherwise stated. <u>Bid prices must include transportation, prepaid by Bidder to destination. Bids other than FOB destination may be rejected.</u> All general or special conditions, prices and terms contained in the accepted bid, and official rules and regulations for purchasing shall apply to all purchases.					
Requisitioned by and telephone no: James Altman 337-521-8897		Bidder's Signature:			Date:	



South Louisiana Community College
320 Devalcourt St.
Lafayette, LA 70506
337.521.8896

Solicitation Statement:

SLCC is soliciting bids for the following scope of work. **The target work completion date is NLT June 15, 2009 and as soon as possible after authorization to proceed.** The successful bidder will be responsible for a turnkey job to include, but not limited to, the proper and complete solicitation and receipt of all city, parish, and state (construction, environmental, etc.) permits (as required), providing project management, supervision, liaison to SLCC, qualified personnel and proper equipment to safely, successfully, completely and expeditiously perform this scope of work.

Scope Statement:

The successful bidder/contractor shall be responsible for a turn key project completion including, but not necessarily limited to permitting (as required), preparing, constructing, electrical lighting, cleaning, striping and job cleanup of a ten slot concrete parking lot according to the attached two drawings and specification. All material and labor shall be included in the bid. A contingency fee shall be incorporated in the bid as a line item separate from the cost of the construction and will be considered as part of the bid evaluation in sum with the cost of construction. Weather days will not be counted as working days. Each weather day or portion thereof will be jointly agreed upon between the successful bidder and SLCC.

Project time is important. Work shall be accomplished **safely** and **properly** according to this scope and sound construction codes, standards and material, such that work is finished on or prior to June 15, 2009 and as soon as possible after authorization to proceed. Additionally, a hard copy project schedule will be provided to SLCC. Finally, a brief project meeting will be presented to SLCC by the contractor project manager every week until project completion. Project progress and construction positives, issues and contingencies will be discussed and documented during these weekly status meetings.

Bidder Initials _____



South Louisiana Community College
320 Devalcourt St.
Lafayette, LA 70506
337.521.8896

Administrative:

A one-time mandatory pre-bid meeting will be held for all bidders. This pre-bid meeting is a requirement for bid consideration. The pre-bid meeting will occur on site at 320 Devalcourt St. (Rm. 123) Lafayette, LA on **Tuesday April 28, 2009 at 09:00AM** and will be presented by SLCC Facilities Coordinator, Ed Lopez. Bid award shall be based on the total sum of the construction cost and contingency fee. Requested and approved change requests will be required to access the contingency fee funds. During this meeting a review of the scope, followed by a question and answer session, will take place. Bidders will then be shown the area of construction. Additional information, if applicable, will be distributed at this time. A site visit (documented by sign-in) is required of all bidders.

Considerations:

Any and all damage to SLCC or area properties will be the responsibility of the successful bidder/contractor. Access to the construction area will require barricades/safety tape to partially limit normal parking to the area. The successful bidder shall be covered by insurance levels and requirements set forth by the State of Louisiana, Office of Risk Management, and SLCC to include proper liability limits and workman's compensation. A certificate of insurance shall be submitted immediately upon bid award.

Signed and sealed bid sheets shall be mailed/delivered (**received by due date of Tuesday May 08, 2009 2:00PM**).

Addressed to:

Mr. James Altman, Business Office

320 Devalcourt St.

Lafayette, LA 70506

Contact for administrative bid questions Phone: 337.521.8897

Contact for scope questions is:

Mr. Ed Lopez, Facilities Coordinator

320 Devalcourt St.

Lafayette, LA 70508?

Phone of Contact: 337.521.8901; Cell: 337.288.3035

Should the primary successful bidder decline acceptance of the bid (requiring documented reasoning submitted to SLCC) the judged secondary bidder will be awarded the bid.

Bidder Initials _____



South Louisiana Community College
320 Devalcourt St.
Lafayette, LA 70506
337.521.8896

! IMPORTANT! Please read carefully:

- ☐ **PAYMENT TERMS ARE AS NORMALLY PROVIDED BY STATE CONTRACT. IN LIEU OF BOND PAY SHALL BE WITHHELD PENDING SATISFACTORY COMPLETION OF THE PROJECT. ADDITIONALLY, SHOULD THE AWARDED BIDDER/CONTRACTOR FAIL TO SUCCESSFULLY COMPLETE THE PROJECT ACCORDING TO ITS TERMS AND SCOPE, SLCC RESERVES THE RIGHT TO WITHOLD PAYMENT UNTIL THE PROJECT IS FULLY AND SUCCESSFULLY COMPLETED, AS DETERMINED BY SLCC/LCTCS/LCTCS LEGAL COUNSEL.**
- ☐ **Price alone may not determine the successful bidder.**
- ☐ **SLCC has the right to reject any and all bids and re-bid.**
- ☐ **All valid bids must and shall be signed by the bidder's person of authority responsible for signing official documents. An unsigned bid will lose consideration.**
- ☐ **In the event that a bidder declines to bid, please return the bid form with "NO BID" appropriately indicated on the document.**
- ☐ **Failure to submit a bid or a LATE bid will be interpreted as no interest and will forfeit consideration in the bid and possible future bids.**

Bidder Initials _____



South Louisiana Community College
320 Devalcourt St.
Lafayette, LA 70506
337.521.8896

BID SUMMARY FORM (FOR USE AS NECESSARY BY BIDDER; ATTACH TO BID IF NECESSARY)

Date: _____

Bid –2009 TEN SPOT CONCRETE PARKING ADDITION – SLCC LAFAYETTE
(Please initial each Bid Form page at provided area at foot of page.)

Please deliver/mail/ Sealed bid on or prior to Tuesday May 08, 2009 before 2:00PM to:

Attn: James Altman
320 Devalcourt St.
Lafayette, LA 70508

Phone: 337.521.8897

Description	Bid Amount	Comments/Clarifications/Exceptions
1)Bid awarded contractor shall be responsible for permitting (as required), preparing, constructing and cleaning, striping and job cleanup of a ten slot concrete parking lot according to the attached two drawings and specification.		
2)Project Contingency Fee		
(Sum of 1 & 2 above) Total Bid		

Comments/Clarifications/Comments:

Printed Name: _____

Company: _____

Signature _____

Address: _____

Phone: _____

Section 03 10 00 - Concrete Formwork

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provide all materials, labor, equipment and incidental services for the installation of all forms for structural concrete.
- B. All formwork shall conform to all requirements of ACI 301, Standard Specifications for Structural Concrete and ACI 318, Building Code Requirements for Reinforced Concrete, published by the American Concrete Institute, Detroit, Michigan, except as modified by the requirements of these Contract Documents.
- C. The design and engineering of formwork, as well as its construction shall be the responsibility of the Contractor. All formwork shall comply with the American Concrete Institute (ACI) Standard "Recommended Practice for Concrete Formwork" (ACI-347).
- D. Contractor shall adjust formwork construction as required to accommodate all inserts, openings, chases, thimbles, etc. necessary to complete work of other trades described in architectural, mechanical and electrical contract documents.
- E. Forms shall have sufficient strength to withstand all forces resulting from placement and vibration of the concrete and shall have sufficient rigidity to maintain specified tolerances.

PART 2 - PRODUCTS

- 2.1 Earth cuts may be used as forms for footings and grade beams if the surfaces can be held true to line and grade without wetting. Earth cut forming may not be used on concrete surfaces to be exposed. If a previously acceptable earth cut form is ruined by rain, sloughing or other such phenomenon, the Contractor shall remove reinforcing steel, re-excavate and provide form materials as required to meet specified tolerances.
- 2.2 All lumber and plywood shall be sound and undamaged and shall conform to requirements of ACI Special Publication No. 4, Formwork for Concrete.
- 2.3 For exposed concrete surfaces, use form liners or special coatings to prevent wood grain marks on the concrete surface.

PART 3 - EXECUTION

- 3.1 Construct all formwork so as to insure that the concrete surfaces will not exceed the following tolerances:
 - A. Footing Dimensions:
 - 1. plan.....plus 6 inch; minus 0 inch
 - 2. depth.....plus 4 inch; minus 0 inch
 - B. Variation from plumb of column center lines and surfaces..... $\frac{1}{4}$ inch per 10 feet but not more than 1 inch.
 - C. Slab variation from the designated planes..... $\frac{1}{4}$ inch per 10 feet but not more than $\frac{1}{2}$ inch.
 - D. Variation from designated elevation (top and bottom of slabs and beams)..... $\frac{1}{2}$ inch.
 - E. Variation of the building line from established position.....1 inch.
 - F. Variation in cross-sectional dimensions of beams and columns and in thickness of slabs and walls.....plus $\frac{1}{2}$ inch; minus $\frac{1}{4}$ inch.

- 3.2 Where those tolerances do not apply, all tolerances shall comply with those suggested in ACI 347 "Recommended Practice for Concrete Formwork".
- 3.3 Forms shall not allow leakage of cement paste.
- 3.4 Form coatings to prevent bond with concrete shall be applied before reinforcing is placed. Coating material shall not be allowed to stand in puddles within the forms; nor be allowed to contact concrete against which fresh concrete is to be placed.
- 3.5 ACCESSORIES AND INSERTS
 - A. Form accessories to be wholly or partially embedded in the concrete, such as ties and hangers, shall be a commercially manufactured type and shall break off not less than one inch within the concrete surface.
 - B. All inserts necessary for connecting work shall be securely fastened in proper position before concrete placement begins.
- 3.6 FORM REMOVAL
 - A. All structural members shall be adequately shored until control cylinder tests indicate the concrete has reached its specified 28 day compressive strength.
 - B. Side forms for grade beams may be removed 24 hours after concrete is placed.
 - C. When side forms are removed within 48 hours of pour, these formed surfaces shall be cured by damp mats or curing compounds as herein specified.
 - D. Immediately after stripping forms remove all projections and patch surface defects with a mortar paste of same proportions as concrete. Defects which expose reinforcing steel or which extend over an area greater than 200 square inches shall not be repaired until inspected by Architect.

END OF SECTION 03 10 00

Section 03 20 00 - Concrete Reinforcing Steel

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provide all materials, labor, equipment, incidental services and accessories to place all reinforcing steel included in the Contract.
- B. All reinforcing steel work shall conform to all requirements of ACI 301, Standard Specifications for Structural Concrete and ACI 318, Building Code Requirements for Reinforced Concrete, published by the American Concrete Institute, Detroit, Michigan, except as modified by the requirements of these Contract Documents.
- C. Comply with requirements of the following codes and standards, except as herein modified (latest editions):
 - 1. American Concrete Institute, ACI 318 "Building Code Requirements for Reinforced Concrete".
 - 2. American Welding Society, AWS D12.1, "Reinforcing Steel Welding Code."
 - 3. American Concrete Institute, ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures."
 - 4. Concrete Reinforcing Steel Institute, "Recommended Practice for Placing Reinforcing Bars."
 - 5. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
- D. Shop drawings shall be prepared by the Contractor to guide workmen in fabrication and placement of reinforcing and to provide additional assurance that there are no substantive discrepancies in the broader description of the project contained in the Contract Documents.
- E. Submit to the Architect for review, two prints and one sepia of all Shop Drawings showing the fabrication and placing of reinforcing steel and accessories. Before submittal to the Architect, all Shop Drawings shall be checked by the Contractor and shall be signed to certify that this has been done. The Architect will review these Drawings and return the sepia to the Contractor with marks thereon indicating any exceptions taken to the content of these Drawings. Review of Shop Drawings shall be only for general conformance with design concept of the Project and for general compliance with information given in the Contract Documents. Review of the Shop Drawings shall not be construed as approval of quantities and dimensions, of fabricating process, of construction techniques or of approval of any variance from the intent of the Contract Documents.
- F. Reinforcement shall be stored on the site to prevent damage. Provide adequate blocking to prevent bars from contacting the ground. Any mud on bars shall be removed and bar brushed clean before placing bar in form.

PART 2 - PRODUCTS

- 2.1 Reinforcing bars including those in footings shall conform to American Society for Testing Materials (ASTM) Specification A615 Grade 60 or ASTM A616 Grade 60 including Supplementary Requirements S1.
- 2.2 Reinforcing bars which are welded to inserts, such as angles and plates, shall conform to ASTM A615 Grade 40 or ASTM A616 Grade 40 including Supplementary Requirements S1.

PART 3 - EXECUTION

3.1 DETAILING AND PLACING REINFORCEMENT

- A. Details of reinforcement, steel supports and accessories shall be in accordance with the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" (ACI 315).
- B. Reinforcing in footings and in grade beams shall be supported on precast concrete blocks (2500 psi concrete) and secured with a tie wire. These blocks shall be cast on Site by the Contractor or purchased from a reputable supplier. Thickness of the blocks shall be determined by the clear concrete cover shown on the Drawings. Plan size of the blocks shall be 2 inches by 2 inches minimum.
- C. Reinforcing in slabs on grade shall be supported on precast concrete blocks as described above or on slab bolsters with sand plates or chairs with sand plates.
- D. Place reinforcing steel to a tolerance of $\pm\frac{1}{4}$ inch in slabs and $\pm\frac{1}{2}$ inch in beams and columns and tie securely in place to prevent movement during pouring of concrete.
- E. Bar supports shall be spaced a maximum of 2 feet apart on #3 bars, 3 feet apart on #4 bars, 4 feet apart on #5 bars and 5 feet apart on #6 bars and larger. Welded wire fabric shall be manufactured and delivered in flat sheets and shall be supported at a maximum of 2 feet in either grid direction. Increase support for reinforcement as necessary to prevent its moving out of specified tolerances due to laborers walking over it during concrete placement.
- F. Do not weld or tack crossing bars for assembly of reinforcement.
- G. All welding of reinforcement anchors to inserts shall conform to the Reinforcing Steel Welding Code (AWS D12.1).
- H. Reinforcing rods may be shifted a maximum of 6 inches from original position to accommodate slab openings. Otherwise, rods shall be cut at openings and replacement rods shall be added on each side of the opening. These replacement rods shall splice the cut rods with laps of 36 diameters.
- I. Contractor shall provide carrying bars, dowels, hangers, tie wires and other commonly used devices as required to hold reinforcement in designated position until all concrete is poured and set.

3.2 MINIMUM REINFORCEMENT

- A. Provide 24" by 24", 90 degree corner bars at all corners and intersections of footings, foundation walls and grade beams with bars the same size and number as horizontal reinforcing, unless otherwise noted on the drawings.
- B. If slab openings exceed 12 inches on any side and no specific detail is shown on the Drawings add 2 #4 rods at 45 degrees at each corner of the opening. These rods shall be at least twice as long as the longest side of the opening.
- C. Provide additional supplemental reinforcing steel in the structure if required to accommodate the Contractor's means, methods and sequence of construction.
- D. Place continuous temperature steel reinforcement in all slabs in conformance to ACI 318 unless heavier reinforcement is noted on the Drawings. Lap all bars thirty diameters and hook at slab edges. Place temperature steel perpendicular to main reinforcing. If no reinforcing is indicated in slab place temperature steel in both directions. Temperature steel shall be at least No. 3 bars 12 inches apart in 3 inch and 4 inch slabs; No. 4 bars 12 inches apart in 5 inch, 6 inch and 7 inch slabs and No. 5 bars 15 inches apart in 8 inch slabs.

END OF SECTION 03 20 00

Section 03 30 00 - Cast-In-Place Concrete

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provide all materials, labor, equipment and incidental services required to complete all concrete work in the Contract.
- B. All concrete work shall conform to all requirements of ACI 301, Standard Specifications for Structural Concrete and ACI 318, Building Code Requirements for Reinforced Concrete, published by the American Concrete Institute, Detroit, Michigan, except as modified by the requirements of these Contract Documents.
- C. All references herein to standards of the American Concrete Institute (ACI) and the American Society for Testing Materials (ASTM) apply to the latest revisions thereof.
- D. Cooperate with the Testing Laboratory in its performance of services pertaining to concrete work as specified elsewhere in these Specifications.

PART 2 - PRODUCTS

- 2.1 Portland Cement shall conform to ASTM Specification C150 Type I.
- 2.2 Fly ash shall not be used.
- 2.3 Aggregates shall conform to ASTM Specification C33. The maximum size of aggregate shall be no larger than one-fifth ($1/5$) of the narrowest dimension between sides of forms within which the concrete is to be cast nor larger than three-fourths ($3/4$) of the minimum clear spacing between reinforcing bars, or between reinforcing bars and forms.
- 2.4 Mixing water for concrete shall be fresh, clean and potable.
- 2.5 A water reducing admixture shall be used. Admixture shall conform to ASTM C494 Type A or Type D. Admixture shall be proportioned and mixed in accordance with manufacturer's recommendations.
- 2.6 An air-entraining admixture is not required but is acceptable if it conforms to ASTM C260 and is compatible with the required water reducing admixture. Submit such admixtures for approval by the Architect prior to use.
- 2.7 If admixtures contain chloride ions, the percent by weight of cement shall be furnished in writing to the Architect.
- 2.8 In no case shall the sum of chloride ions from all sources exceed 0.15 percent by weight of cement in conventionally reinforced concrete and 0.06 percent in prestressed concrete.
- 2.9 All admixtures shall be used in accordance with the manufacturer's instructions.

PART 3 - EXECUTION

3.1 QUALITY OF CONCRETE

- A. Ready-mixed concrete shall be proportioned mixed and transported in accordance with ASTM C94 "Specifications for Ready-Mix Concrete".
- B. Pumped concrete shall be placed in accordance with "Placing Concrete by Pumping Methods" by ACI Committee 304.

- C. All concrete mixes shall be designed (or verified) by an independent testing laboratory as specified elsewhere in these Specifications.
- D. Designed concrete mixes shall conform to the following table:

Construction	Type of Concrete	28 Day Compressive Strength	Min. Sacks ^{1,2} of Cement Per Cu. Yd.	Slumps ³
All Concrete	Normal Weight	3500 psi	5	4

¹ If the Ready Mix Supplier cannot provide data to the testing lab to establish standard deviation and/or trial batch mix design, then concrete mixes shall conform to the following table:

**MAXIMUM PERMISSIBLE WATER-CEMENT RATIOS AND
MINIMUM CEMENT CONTENTS FOR CONCRETE
(WHEN STRENGTH DATA FROM TRIAL BATCHES OR
FIELD EXPERIENCE IS NOT AVAILABLE)**

Specified compressive strength psi	Minimum sks. cement per cu. yd. concrete	Maximum permissible water-cement ratio			
		Non-air-entrained concrete		Air-entrained concrete	
		Absolute ratio by weight	U.S. gal. per 94-lb. bag of cement	Absolute ratio by weight	U.S. gal. per 94-lb. bag of cement
3500	6	0.51	5.8	0.40	4.5

Strengths above 4000 psi shall be designed according to ACI 318.

² In no case shall the cement content be less than the above minimum. If a higher cement content is required to meet the specified strength it shall be supplied at no extra cost to the Owner.

³ Slumps of pumped concrete placed without a pump aid admixture shall not exceed 6 inches at the pump hopper and shall not exceed the specified values at the discharge nozzle. In no case shall the concrete water-cement ratio be increased.

- E. The strength of concrete and its slump shall be verified by tests performed by an independent testing laboratory as specified under CONCRETE TESTING AND QUALITY CONTROL.
- F. Each truck sent from the Ready-mix Plant to the Job site shall have a delivery ticket containing at least the following information:
1. Name of Ready-mix Plant and serial number of ticket.
 2. Date and truck number.
 3. Name of Job and Contractor.
 4. Number of sacks of cement per cubic yard.
 5. Amount of concrete.
 6. Amount of water.
 7. Time of day truck was loaded.

- G. Any truck without a proper ticket shall be rejected.

3.2 PLACING CONCRETE

- A. Concrete shall be placed according to the recommendations of ACI Committee 304. Consolidation of concrete shall conform to recommendations of ACI Committee 309.
- B. If concrete arrives at the Project with its slump below that suitable for placing, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. Use additional mixing as required to fully incorporate the added water.
- C. No concrete shall be placed until all of the following are accomplished:
1. All reinforcement and other embedded items are securely fastened in proper position and all formwork for the placement is completed.
 2. All debris is removed from the places to be occupied by the concrete.

3. All water (in amounts large enough to appreciably alter the water-cement ratio) has been removed from the places to be occupied by the concrete.
 4. All reinforcement is thoroughly cleaned of detrimental coating or debris.
 5. All forms are thoroughly wetted (except in freezing weather) or oiled.
- D. Equipment and procedures for chuting, pumping and pneumatically conveying concrete from mixer to forms shall insure a continuous flow of concrete at the delivery end without segregation of the concrete materials.
 - E. Deposit concrete as nearly as practical to its final position to avoid segregation due to rehandling or flowing.
 - F. Place concrete in a continuous operation until placement of the panel or section is completed. When construction joints are necessary, make them in accordance with JOINTS AND EMBEDDED ITEMS.
 - G. Consolidate all concrete during placement and work concrete thoroughly around reinforcement and embedded fixtures and into the corners of the forms.
 - H. If placing concrete in atmospheric temperatures below 40 degrees F., provide adequate equipment to maintain concrete temperatures at 50 degrees F. or higher during placing. (See CURING AND PROTECTION for cold weather methods).
 - I. Pump hoses used for placing concrete shall not be in contact with the reinforcing steel. All such hoses shall be supported on special brackets, troughs or such devices to prevent contact between hoses and reinforcing steel throughout the concrete work.
 - J. Finished concrete surfaces shall not exceed the tolerances specified in the CONCRETE FORMWORK specification section.

3.3 JOINTS AND EMBEDDED ITEMS

- A. Joint fillers shall extend full depth of joint and shall be of the thickness shown on the Drawings.
- B. Use asphalt impregnated fiberboard conforming to ASTM D-1751 for expansion joint fillers.
- C. Construction joints not shown on the Drawings shall be properly keyed and shall be located at sections of minimum shear. Prior approval of the Architect is required for such joints.
- D. Edges of concrete at joints shall be straight and sound. Remove unsound or unbonded material and repair all chips, spalls, cracks or other damaged edges.
- E. Concrete surfaces at all construction joints shall be thoroughly cleaned and all laitance removed. Hardened concrete surfaces shall be wetted and slushed with a coat of cement grout immediately before placing fresh concrete.
- F. All sleeves, inserts, anchors and other embedded items required for other work shall be placed prior to concreting.
- G. Position all embedded items accurately and support them against displacement during concrete operations.
- H. Exposed control joints shall be sealed with a gray colored paving sealant which has been approved by the Architect.

3.4 CURING AND PROTECTION

- A. Cure concrete for at least 7 days after placement by keeping it in a moist condition by one of the following methods:
 1. Ponding or continuous sprinkling.
 2. Absorptive mat or fabric kept continuously wet.
 3. Curing compounds conforming to ASTM C309 "Specifications for Liquid Membrane-Forming Compounds for Curing Concrete". Apply such compounds in two (2) coats at right angles to each other. Apply at a rate of at least 200 square feet per gallon.
- B. Do not use curing compound on areas of concrete which must be bonded to subsequent concrete pours.
- C. During the curing period, protect the concrete from load stresses and damaging mechanical disturbances such as heavy shock and excessive vibration. Also protect all finished concrete surfaces from damage.

- D. If concrete is placed in atmospheric temperatures below 40 degrees F., the temperature of the concrete shall be maintained at 50 degrees F. or greater during placing and during the entire 7 day curing period.
- E. During curing, the temperature of the concrete shall not be allowed to change more than plus (+) or minus (-) five degrees Fahrenheit in any one (1) hour period nor more than plus (+) or minus (-) fifty degrees Fahrenheit in any twenty-four (24) hour period.

3.5 REPAIR OF DEFECTIVE SURFACES

- A. Defective formed surfaces shall be repaired in conformance with ACI 301.

3.6 CONCRETE TESTING AND QUALITY CONTROL

- A. The Contractor shall pay a testing laboratory approved by the Owner to perform the following services:
 - 1. Each person inspecting the Work shall be certified by the American Concrete Institute as a Concrete Field Testing Technician - Grade I.
 - 2. If required by the Owner, provide written certification that the ready-mix plant (plants) supplying concrete for the Project is in compliance with ASTM C94.
 - 3. If the supplier proposes a mix, provide written certification that each concrete mix proposed by the supplier complies with the field experience method of mix design as specified in ACI 318. This certification shall contain copies of the consecutive strength tests used to determine standard deviation and average strength of the proposed mix.
 - 4. If the field experience method cannot be used, then design each concrete mix in accordance with ACI 318 by the trial batch method. Submit the design mix curves for each concrete strength to the Architect at least seven (7) days before concrete is poured.
 - 5. Prepare and test cylinders four (4) per one hundred (100) cubic yards if required by the Contractor to determine when forms may be removed. These cylinders shall be stored near the structure and shall receive the same cure and protection as the cast concrete from which they were obtained. Test shall be performed immediately upon removal from the job site.
- B. If the Contractor fails to notify the Testing Laboratory of a scheduled pour and as a result no cylinders are taken, the Contractor shall bear the cost of verifying that the in place concrete meets the strength requirements of the specifications. Cores shall be extracted and tested from the cast-in-place concrete in accordance with ASTM C42. Location of cores shall be determined by the Architect.
- C. The Owner shall pay the testing laboratory to perform the following services:
 - 1. Each person inspecting the Work shall be certified by the American Concrete Institute as a Concrete Field Testing Technician - Grade I.
 - 2. Secure production samples of materials at plant stockpiles during the course of the Work and test for compliance with the Specifications.
 - 3. Inspect the loading ticket for each concrete truck at the job site. Each ticket shall include all of the information required by these Specifications. Reject any truck which is not properly ticketed.
 - 4. For each different mix placed, cast compression test cylinders according to the following schedule. Cast cylinders in groups of four (4). Cast each group from a different truck load (or batch) and use concrete from middle portion of the truck load. Field mark each cylinder for identification.

LOCATION OF CONCRETE

Footings
Beams, walls

OF FOUR CYLINDER GROUPS REQUIRED

One per fifty cubic yards placed
One per fifty cubic yards placed

- 5. If the total placement in one (1) day is less than the amounts listed above, one group of four (4) cylinders shall be taken from the day's placement.
- 6. For each group of cylinders, test one (1) at seven (7) days and two (2) at twenty-eight (28) days. Hold one cylinder for additional testing if necessary. Submit prompt written reports of these tests to the Architect, Structural Engineer, Contractor, Ready-mix Supplier and to other parties designated by the Architect.
- 7. Cast and cure all cylinders in accordance with ASTM Specification C31. Test cylinders in accordance with ASTM Specification C39. All slump tests shall conform to ASTM Specification C143.

8. Reports on test cylinders shall contain the standard data plus the following specific information on each cylinder:
 - a. The identifying mark placed on the cylinder in the field.
 - b. The actual measured slump of each specimen.
 - c. Amount of concrete in truck.
 - d. Amount of water in truck.
 - e. The date and time of day the cylinder was molded.
 - f. The date on which the cylinder was received by the Laboratory and placed in the required controlled environment.
 - g. The date the cylinder was tested.
 - h. The total cubic yards of the pour from which the cylinders were taken.
9. All cylinders shall be stored at the site and shipped to the Laboratory in rigid containers. Straw or similar shock absorbing material shall be stuffed between and around each cylinder during shipment.

D. If any material is found not to comply with these specifications, the testing laboratory shall immediately notify the Contractor that the material is rejected. If the Contractor persists in placing the rejected material into the work, the testing laboratory shall immediately notify the Architect. If a rejected batch of concrete is poured by the Contractor, the testing laboratory shall obtain a set of cylinders from the rejected batch.

3.7 DEFECTIVE WORK AND RETESTING

- A. When quality control tests performed by the testing laboratory show that materials fail to meet the specified requirements, the Contractor shall correct and/or remove and replace all defective work and shall coordinate retesting with the testing laboratory. All costs associated with reinspection and retesting of defective work shall be the sole responsibility of the Contractor and shall be withheld from the first subsequent pay request.

END OF SECTION 03 30 00

Section 260500 - Common Work Results for Electrical

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Electrical equipment coordination and installation.
2. Grout.
3. Common electrical installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 3. To allow right of way for piping and conduit installed at required slope.
 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- L. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 260500

Section 260519 - Low-Voltage Electrical Power Conductors and Cables

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. Building wires and cables rated 600 V and less.
- 2. Connectors, splices, and terminations rated 600 V and less.
- 3. Sleeves and sleeve seals for cables.

- B. Related Sections include the following:

- 1. Division 27 Section "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.6 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Aluminum and Copper Conductors: Comply with NEMA WC 70.
- B. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.
- C. Multiconductor Cable: Comply with NEMA WC 70 for armored cable, Type AC metal-clad cable, Type MC mineral-insulated, metal-sheathed cable, and Type NM Type SO.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- E. Feeders Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.
- F. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.

- G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- J. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- K. Class 2 Control Circuits: Type THHN-THWN, in raceway or Power-limited cable, concealed in building finishes.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

- C. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install seal with firestop materials according to Division 07 Section "Penetration Firestopping."
- D. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.

3.6 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground exterior-wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- C. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

Section 260533 - Raceway and Boxes for Electrical Systems

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Aluminum Rigid Conduit: ANSI C80.5.
- C. IMC: ANSI C80.6.
- D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit IMC.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch, minimum.
- E. EMT: ANSI C80.3.
- F. FMC: Zinc-coated steel or aluminum.
- G. LFMC: Flexible steel conduit with PVC jacket.
- H. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Fittings for EMT: set-screw or compression type.
 - 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.
- I. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. ENT: NEMA TC 13.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- C. LFNC: UL 1660.
- D. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
- E. Fittings for LFNC: UL 514B.

2.3 METAL WIREWAYS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D; Schneider Electric.
- C. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1 12 3R, unless otherwise indicated.
- D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- E. Wireway Covers: Screw-cover type.
- F. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hoffman.
 - 2. Lamson & Sessions; Carlon Electrical Products.
- C. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.
- D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.5 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect Prime coating, ready for field painting.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Thomas & Betts Corporation.
 - b. Walker Systems, Inc.; Wiremold Company (The).
 - c. Wiremold Company (The); Electrical Sales Division.
- B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard custom colors.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Butler Manufacturing Company; Walker Division.
- b. Enduro Systems, Inc.; Composite Products Division.
- c. Hubbell Incorporated; Wiring Device-Kellems Division.
- d. Lamson & Sessions; Carlon Electrical Products.
- e. Panduit Corp.
- f. Walker Systems, Inc.; Wiremold Company (The).
- g. Wiremold Company (The); Electrical Sales Division.

2.6 BOXES, ENCLOSURES, AND CABINETS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. EGS/Appleton Electric.
3. Erickson Electrical Equipment Company.
4. Hoffman.
5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
6. O-Z/Gedney; a unit of General Signal.
7. RACO; a Hubbell Company.
8. Robroy Industries, Inc.; Enclosure Division.
9. Scott Fetzer Co.; Adalet Division.
10. Spring City Electrical Manufacturing Company.
11. Thomas & Betts Corporation.
12. Walker Systems, Inc.; Wiremold Company (The).
13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

- E. Metal Floor Boxes: Cast or sheet metal, fully adjustable, rectangular.

- F. Nonmetallic Floor Boxes: Nonadjustable, round.

- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

- H. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized, cast iron with gasketed cover.

- I. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

- J. Cabinets:

1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.

3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit.
2. Concealed Conduit, Aboveground: Rigid steel conduit EMT or RNC, Type EPC-40-PVC.
3. Underground Conduit: RNC, Type EPC-40 -PVC, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT or RNC.
2. Exposed, Not Subject to Severe Physical Damage: EMT or RNC identified for such use.
3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: Rigid steel conduit or IMC.
7. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical fiber/communications cable raceway or EMT.
8. Raceways for Optical Fiber or Communications Cable Risers in Vertical Shafts: Riser-type, optical fiber/communications cable raceway or EMT.
9. Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: EMT.
10. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel or nonmetallic in damp or wet locations.

C. Minimum Raceway Size: 1/2-inch 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.

E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

- F. Do not install aluminum conduits in contact with concrete.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
 2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
 3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.

- N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- P. Set metal floor boxes level and flush with finished floor surface.
- Q. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

- 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
- 2. Install backfill as specified in Division 31 Section "Earth Moving."
- 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
- 4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
- 5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

SOUTH LOUISIANA COMMUNITY COLLEGE PARKING LOT
320 DEVALCOURT STREET
LAFAYETTE, LOUISIANA

3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.6 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

Section 265600 - Exterior Lighting

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

1. Exterior luminaires with lamps and ballasts.
2. Luminaire-mounted photoelectric relays.
3. Poles and accessories.
4. Luminaire lowering devices.

1.3 DEFINITIONS

- A. CRI: Color-rendering index.
- B. HID: High-intensity discharge.
- C. Luminaire: Complete lighting fixture, including ballast housing if provided.
- D. Pole: Luminaire support structure, including tower used for large area illumination.
- E. Standard: Same definition as "Pole" above.

1.4 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

- A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4.
- B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4.
- C. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4.
- D. Wind Load: Pressure of wind on pole and luminaire, calculated and applied as stated in AASHTO LTS-4.
 1. Wind speed for calculating wind load for poles exceeding 50 feet in height is 110 mph.
 2. Wind speed for calculating wind load for poles 50 feet or less in height is 110 mph.

1.5 SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:

1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
2. Details of attaching luminaires and accessories.
3. Details of installation and construction.
4. Luminaire materials.
5. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.
 - a. For indicated luminaires, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
 - b. Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
6. Photoelectric relays.
7. Ballasts, including energy-efficiency data.
8. Lamps, including life, output, and energy-efficiency data.
9. Materials, dimensions, and finishes of poles.
10. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
11. Anchor bolts for poles.
12. Manufactured pole foundations.

B. Shop Drawings:

1. Anchor-bolt templates keyed to specific poles and certified by manufacturer.
2. Design calculations, certified by a qualified professional engineer, indicating strength of screw foundations and soil conditions on which they are based.
3. Wiring Diagrams: Power and control wiring.

C. Samples for Verification: For products designated for sample submission in Exterior Lighting Device Schedule. Each sample shall include lamps and ballasts.

D. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4 and that load imposed by luminaire has been included in design.

E. Qualification Data: For agencies providing photometric data for lighting fixtures.

F. Field quality-control test reports.

G. Operation and Maintenance Data: For luminaires and poles luminaire lowering devices to include in emergency, operation, and maintenance manuals.

H. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- C. Comply with IEEE C2, "National Electrical Safety Code."
- D. Comply with NFPA 70.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Package aluminum poles for shipping according to ASTM B 660.
- B. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- C. Handle wood poles so they will not be damaged. Do not use pointed tools that can indent pole surface more than 1/4 inch deep. Do not apply tools to section of pole to be installed below ground line.
- D. Retain factory-applied pole wrappings on fiberglass and laminated wood poles until right before pole installation. Handle poles with web fabric straps.
- E. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fixture Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:
 - 1. **Basis of Design Product:** The design of each item of exterior luminaire and its support is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified. Fixtures requiring prior approval shall be submitted seven days prior to bidding.

2.2 LUMINAIRES, GENERAL REQUIREMENTS

- A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
- B. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

- G. Exposed Hardware Material: Stainless steel.
- H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- J. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- M. Factory-Applied Finish for Steel luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - a. Color: As selected by Architect from manufacturer's full range.
- N. Factory-Applied Finish for Aluminum luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - 2. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - a. Color: By Architect.

2.3 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

- A. Comply with UL 773 or UL 773A.
- B. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.
 - 1. Relay with locking-type receptacle shall comply with NEMA C136.10.
 - 2. Adjustable window slide for adjusting on-off set points.

2.4 FLUORESCENT BALLASTS AND LAMPS

- A. Low-Temperature Ballast Capability: Rated by its manufacturer for reliable starting and operation of indicated lamp(s) at temperatures 0 deg F minus 20 deg F and higher.
- B. Ballast Characteristics:
 - 1. Power Factor: 90 percent, minimum.
 - 2. Sound Rating: A.
 - 3. Total Harmonic Distortion Rating: Less than 10 20 percent.
 - 4. Electromagnetic Ballasts: Comply with ANSI C82.1, energy-saving, high power factor, Class P, automatic-reset thermal protection.
 - 5. Case Temperature for Compact Lamp Ballasts: 65 deg C, maximum.
- C. Low-Temperature Lamp Capability: Rated for reliable starting and operation with ballast provided at temperatures 0 deg F minus 20 deg F and higher.
- D. Fluorescent Lamps: Low-mercury type. Comply with the EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.

2.5 BALLASTS FOR HID LAMPS

- A. Comply with ANSI C82.4 and UL 1029 and capable of open-circuit operation without reduction of average lamp life. Include the following features, unless otherwise indicated:
 - 1. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.
 - 2. Minimum Starting Temperature: Minus 22 deg F.
 - 3. Normal Ambient Operating Temperature: 104 deg F.
 - 4. Ballast Fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.
- B. Auxiliary, Instant-On, Quartz System: Factory-installed feature automatically switches quartz lamp on when fixture is initially energized and when momentary power outages occur. System automatically turns quartz lamp off when HID lamp reaches approximately 60 percent of light output.
- C. High-Pressure Sodium Ballasts: Electromagnetic type with solid-state igniter/starter and capable of open-circuit operation without reduction of average lamp life. Igniter/starter shall have an average life in pulsing mode of 10,000 hours at an igniter/starter-case temperature of 90 deg C.
 - 1. Instant-Restrike Device: Integral with ballast, or solid-state potted module, factory installed within fixture and compatible with lamps, ballasts, and mogul sockets up to 150 W.
 - a. Restrike Range: 105- to 130-V ac.
 - b. Maximum Voltage: 250-V peak or 150-V ac RMS.
 - 2. Minimum Starting Temperature: Minus 40 deg F.

2.6 HID LAMPS

- A. High-Pressure Sodium Lamps: ANSI C78.42, CRI 21 (minimum), color temperature 1900 K, and average rated life of 24,000 hours, minimum.

1. Dual-Arc Tube Lamp: Arranged so only one of two arc tubes is lighted at one time and, when power is restored after an outage, the cooler arc tube, with lower internal pressure, lights instantly, providing an immediate 8 to 15 percent of normal light output.
- B. Metal-Halide Lamps: ANSI C78.1372, with a minimum CRI 65, and color temperature 4000 K.
- C. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and color temperature 4000 K.
- D. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 80, and color temperature 4000 K.

2.7 POLES AND SUPPORT COMPONENTS, GENERAL REQUIREMENTS

- A. Structural Characteristics: Comply with AASHTO LTS-4.
 1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in Part 1 "Structural Analysis Criteria for Pole Selection" Article, with a gust factor of 1.3.
 2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.
- B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts, unless otherwise indicated.
- C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
 1. Materials: Shall not cause galvanic action at contact points.
 2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication, unless stainless-steel items are indicated.
 3. Anchor-Bolt Template: Plywood or steel.
- D. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete."

2.8 STEEL POLES

- A. Poles: Comply with ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psig; 1-piece construction up to 40 feet in height with access handhole in pole wall.
 1. Shape: Per schedule.
 2. Mounting Provisions: Butt flange for bolted mounting on foundation.
- B. Steel Mast Arms: Continuously welded to pole attachment plate. Material and finish same as pole.
- C. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- D. Steps: Fixed steel, with nonslip treads, positioned for 15-inch vertical spacing, alternating on opposite sides of pole; first step at elevation 10 feet above finished grade.
- E. Intermediate Handhole and Cable Support: Weathertight, 3-by-5-inch handhole located at midpoint of pole with cover for access to internal welded attachment lug for electric cable support grip.

- F. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug, complying with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
- G. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable and rated for a minimum load equal to weight of supported cable times a 5.0 safety factor.
- H. Platform for Lamp and Ballast Servicing: Factory fabricated of steel with finish matching that of pole.
- I. Factory-Painted Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Interior Surfaces of Pole: One coat of bituminous paint, or otherwise treat for equal corrosion protection.
 - 3. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - a. Color: As selected by Architect from manufacturer's full range.

2.9 ALUMINUM POLES

- A. Poles: Seamless, extruded structural tube complying with ASTM B 429, Alloy 6063-T6 with access handhole in pole wall.
- B. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- C. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug, complying with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
- D. Brackets for Luminaires: Detachable, with pole and adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.
 - 1. Tapered oval cross section, with straight tubular end section to accommodate luminaire.
 - 2. Finish: Same as pole luminaire.
- E. Aluminum Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - a. Color: As selected by Architect from manufacturer's full range.

2.10 FIBERGLASS POLES

- A. Poles: Comply with ANSI C136.20, with access handhole in pole wall.

1. Mounting: Embedded.
 2. Mounting Provisions: Butt flange for bolted mounting on foundation.
- B. Surface Finish: Pigmented polyurethane, with a minimum dry film thickness of 1.5 mils.

2.11 DECORATIVE POLES

- A. Pole Material: As per Schedule.
- B. Mounting Provisions: As per Schedule.
- C. Fixture Brackets: As per Schedule.
- D. Pole Finish: As per Schedule.

2.12 REQUIREMENTS FOR INDIVIDUAL EXTERIOR LIGHTING DEVICES

- A. Refer to Fixture Schedule on Drawings.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

- A. Install lamps in each luminaire.
- B. Fasten luminaire to indicated structural supports.
 1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources.

3.2 POLE INSTALLATION

- A. Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.
- B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features, unless otherwise indicated on Drawings:
 1. Fire Hydrants and Storm Drainage Piping: 60 inches.
 2. Water, Gas, Electric, Communication, and Sewer Lines: 10 feet.
 3. Trees: 15 feet.
- C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Division 03 Section "Cast-in-Place Concrete."
- D. Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.

1. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
 2. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.
 3. Install base covers, unless otherwise indicated.
 4. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
- E. Embedded Poles with Tamped Earth Backfill: Set poles to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.
1. Dig holes large enough to permit use of tampers in the full depth of hole.
 2. Backfill in 6-inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.
- F. Embedded Poles with Concrete Backfill: Set poles in augered holes to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.
1. Make holes 6 inches in diameter larger than pole diameter.
 2. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of 3000 psi at 28 days, and finish in a dome above finished grade.
 3. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through concrete dome. Arrange to drain condensation from interior of pole.
 4. Cure concrete a minimum of 72 hours before performing work on pole.
- G. Poles and Pole Foundations Set in Concrete Paved Areas: Install poles with minimum of 6-inch- wide, unpaved gap between the pole or pole foundation and the edge of adjacent concrete slab. Fill unpaved ring with pea gravel to a level 1 inch below top of concrete slab.
- H. Raise and set poles using web fabric slings (not chain or cable).

3.3 BOLLARD LUMINAIRE INSTALLATION

- A. Align units for optimum directional alignment of light distribution.
- B. Install on concrete base with top 4 inches above finished grade or surface at bollard location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Division 03 Section "Cast-in-Place Concrete."

3.4 INSTALLATION OF INDIVIDUAL GROUND-MOUNTING LUMINAIRES

- A. Install on concrete base with top 4 inches above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Division 03 Section "Cast-in-Place Concrete."

3.5 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

- B. Steel Conduits: Comply with Division 26 Section "Raceway and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.6 GROUNDING

- A. Ground metal poles and support structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."
 - 1. Install grounding electrode for each pole, unless otherwise indicated.
 - 2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.
- B. Ground nonmetallic poles and support structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."
 - 1. Install grounding electrode for each pole.
 - 2. Install grounding conductor and conductor protector.
 - 3. Ground metallic components of pole accessories and foundations.

3.7 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.
 - 1. Verify operation of photoelectric controls.
- C. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain luminaire lowering devices. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 265600

Section 31 10 00 - Site Clearing

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes the following:

1. Protecting existing trees and shrubs to remain.
2. Removing existing trees and shrubs.
3. Clearing and grubbing
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade improvements.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.
7. Temporary erosion and sedimentation control measures.

- B. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and temporary erosion and sedimentation control procedures.
2. Division 01 Section "Execution" for verifying utility locations and for recording field measurements.
3. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.

1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the Project site.

1.5 PROJECT CONDITIONS

- A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
 - 1. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
 - 1. Protect improvements on adjoining properties and on Owner's property.
 - 2. Restore damaged improvements to their original condition, as acceptable to property owner.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged, and store on Owner's premises where indicated or directed.
- D. Notify utility locator service for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

1.6 EXISTING SERVICES

- A. General: Indicated locations are approximate; determine exact locations before commencing Work.
 - 1. Arrange and pay for disconnecting, removing, capping, and unplugging utility services. Notify affected utility companies in advance and obtain approval before starting this Work.
 - 2. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction
 - 1. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - 2. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within fenced area.
 - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
 - 3. Maintain fenced area free of weeds and trash.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
 - 1. Cover exposed roots with burlap and water regularly.
 - 2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 4. Backfill with soil as soon as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.
 - 1. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.

3.4 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- C. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
 - 4. Use only hand methods for grubbing within tree protection zone.
 - 5. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile topsoil within tree protection zones.
 - 3. Dispose of excess topsoil as specified for waste material disposal.
 - 4. Stockpile surplus topsoil to allow for resspreading deeper topsoil.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.8 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 10 00

Section 31 20 00 - Base and Subbase Materials for Pavement

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Subbase and base course for pavements.
 - 2. Drainage fabric
- B. Provide all materials and equipment required for site clearing, excavation and backfill and site grading specifically required or implied by Contract Documents.
- C. Examine and investigate the building site prior to bid to become fully informed of conditions and problems to be encountered during the Work. No allowance will be made for conditions encountered during construction which were identifiable in nature prior to starting the Work.
- D. Contractor shall comply with L.R.S. 40:1749.13 which states that no person shall excavate or demolish without first ascertaining the location of underground utilities by serving telephonic notice to a regional notification program. In the State of Louisiana, the regional notification program is Louisiana One Call (formerly DOTTIE). In order to serve notice of excavation, this program can be reached by calling 1-800-272-3020.
- E. Final Grading, together with placement and preparation of topsoil for lawns and planting, is specified in Division 2 Section, "Landscape Work".

1.3 DEFINITIONS

- A. Excavation: Consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

1.4 QUALITY CONTROL:

- A. The Owner shall hire an established testing laboratory to test the proposed fill, certify its compliance with these specifications and to obtain the optimum moisture content and indicated Proctor Density. The certification of material compliance shall be received by the Architect prior to the hauling of fill.
- B. All compaction tests shall be done with a Nuclear Density/Moisture Meter.
- C. Reports for compaction tests required under this specification shall include a sketch of the slab plan and paving areas and the location of each test point. Each test point shall be numbered for reference in the report. The locations of these test points shall be approved by the Architect before earthwork begins. If test points are indicated and labeled on the Drawings, no supplemental sketch is required. All reported densities shall be clearly referenced to a test point and to the height of the fill above the prepared subgrade. Reports which do not clearly provide this information shall be rejected.
- D. Each layer of fill shall be certified as complying with the composition and compaction requirements of these specifications prior to the placement of the succeeding layer. If the average compaction is less than specified or if any one test is 3% below specification the layer shall be rejected.

- E. If it becomes necessary to change source of material, or if original borrow pit material changes, certification of the new material shall be identical to the first.
- F. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

1.5 DEFECTIVE WORK AND RETESTING

- A. When quality control tests performed by the testing laboratory show that materials fail to meet the specified requirements, the Contractor shall correct and/or remove and replace all defective work and shall coordinate retesting with the testing laboratory. All costs associated with reinspection and retesting of defective work shall be the sole responsibility of the Contractor and shall be withheld from the first subsequent pay request.

1.6 PROJECT CONDITIONS AND PROVISIONS

- A. Provide all materials and equipment required for site clearing, excavation and backfill and site grading specifically required or implied by Contract Documents.
- B. Examine and investigate the building site prior to bid to become fully informed of conditions and problems to be encountered during the Work. No allowance will be made for conditions encountered during construction which were identifiable in nature prior to starting the Work.
- C. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner or the Architect/Engineer will not be responsible for interpretations or conclusions drawn from the report by Contractor. Data is made available only for convenience of Contractor. A copy of the Geotechnical Report is included within the Project Manual under "Section SID - Soil Investigation Data."
 - 1. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.
- D. Existing Utilities: Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
 - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- E. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Architect and then only after acceptable temporary utility services have been provided.
 - 1. Provide minimum of 48-hour notice to Owner, and receive written notice to proceed before interrupting any utility.
- F. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.

- G. Use of Explosives: Use of explosives is not permitted and shall not be brought onto site.
- H. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.
 - 1. Operate warning lights as recommended by authorities having jurisdiction
- I. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- J. Environmental Requirements: Do not install mixed materials in excess of 10 mph or when temperature is below 40 degrees F.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. FILL BENEATH PAVEMENT

- 1. Subbase: Contractor shall utilize lime stabilization consisting of a mixture of pulverized soil, measured amounts of AASHTO M216 Grade A Lime, and water, compacted to a high unit weight and protected against moisture loss during the curing period. The quantity of lime shall not be less than 10 percent of dry mixed materials by volume for a depth of 8 inches at Standard Duty asphalt paving and for a depth of 12 inches at Heavy Duty asphalt paving. The lime should be placed in two increments. After the first increment has cured for 48 hours, the second increment can be mixed. This mixture should be worked to achieve proper pulverization before compacting to 90% of its maximum dry density as obtained by the Modified Proctor Test (ASTM D 1557).
- 2. Base: Contractor shall utilize crushed limestone conforming to requirements for untreated aggregate type surface course Louisiana Department of Transportation and Development's (DOTD) Standard Specifications for Roads and Bridges. The material shall consist of 100% crushed limestone aggregate and shall show not more than 45% loss when tested in accordance with AASHTO designation T 96; shall show not more than 15% loss when tested in accordance with AASHTO Designation T 104. Compact to 75% minimum relative density as determined by ASTM D 4254. Gradation shall be as follows:

<u>U.S. Sieve</u>	<u>Percent Passing</u>
1-1/2"	100
1"	90-100
1/2"	25-60
#4	0-10
#200	0-1

2.2 GEOTEXTILE DRAINAGE FABRIC

- A. Geotextile Drainage Fabric: Nonwoven, geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; with a minimum weight of 8 ounces per square yard.
- B. Apparent Opening Size: Smaller than U.S. No. 70 sieve.

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION BENEATH PAVING

- A. General: In the area where fill is to be placed remove all surface vegetation and loose topsoil and all organic materials such as grass, roots, tree stumps, etc. If necessary, disc the subgrade and allow to dry (or add water) as required to obtain optimum moisture content in the top 6 inch layer.
- B. After completing the above preparation, proof roll the entire area which receives fill with a loaded dump truck to detect any soft spots or holes. These soft spots or stump holes shall be mucked out and backfilled with fill beneath earth supported slabs and foundations as specified above. Soft spots and holes which have been refilled shall be compacted to 90% of Modified Proctor Density before any new fill is placed.
- C. No fill shall be placed until the subgrade has been certified as complying with these specifications.

3.2 EXCAVATION

- A. Excavation includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
- B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect/Engineer. Unauthorized excavation, as well as remedial work directed by Architect, shall be at Contractor's expense.
- C. Under footings, foundation bases, or retaining walls, fill excavations by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Architect/Engineer.
- D. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect/Engineer.
- E. Additional Excavation: When excavation has reached required subgrade elevations, notify Architect/Engineer who will make an inspection of conditions.
 - 1. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Architect/Engineer.
- F. Removal of unsuitable material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.
- G. Should excavations be oversized because of machine digging tolerances or because of error, such additional volume shall be filled with concrete poured monolithically with the structural section.
- H. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
 - 1. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- I. Dewatering: Prevent surface water and subsurface water from flowing into excavations and from flooding project site and surrounding area.
 - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 - 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavation to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

- J. **Material Storage:** Satisfactory excavated materials may be stockpiled where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
 - 1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
 - 2. Dispose all excess soil material and waste materials from site.
- K. **Excavation for Structures:** Conform to elevations and dimensions shown within a tolerance of plus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
- L. **When excavating for footings and foundations,** take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
- M. **Excavation for Pavements:** Cut surface under pavements to comply with cross-sections, elevations and grades as shown.
- N. **Excavation for Trenches:** Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide 6" to 9" clearance on both sides of pipe or conduit.
 - 1. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
 - 2. For pipes or conduit 5" or less in nominal size and for flat-bottomed multiple-duct conduit units, do not excavate beyond indicated depths. Hand excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
 - 3. For pipes or conduit 6" or larger in nominal size, tanks and other mechanical/electrical work indicated to receive subbase, excavate to subbase depth indicated, or, if not otherwise indicated, to 6" below bottom of work to be supported.
 - 4. Except as otherwise indicated, excavate for exterior water-bearing piping (water, steam, condensate, drainage) so top of piping is no less than 3'-6" below finish grade.
 - 5. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.
 - 6. Backfill trenches with concrete where trench excavations pass within 18" of column or wall footings and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level of bottom of adjacent footing.
 - a. Concrete is specified in Division 3.
 - 7. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Architect/Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.
 - 8. For piping or conduit less than 2'-6" below surface of pavement areas and buildings, see Drawing Sheets C1.1 through C1.16 for compaction requirements. After installation and testing of piping or conduit, proceed with backfilling or placement of roadway subbase.
- O. **Cold Weather Protection:** Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F. (1 degree C).

3.3 COMPACTION

- A. **General:** Compaction during construction shall be controlled by providing minimum percentage of density specified for each area classification indicated below.

- B. **Percentage of Maximum Density Requirements:** Compact soil to not less than the indicated percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with indicated requirements.
 - 1. **Structures, Building Slabs, Pavements:** Compact top 12" of subgrade and each layer of backfill or fill material.
- C. **Moisture Control:** Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
 - 1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - 2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.4 BACKFILL AND FILL

- A. **General:** Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
 - 1. Under pavements, use subbase and base material.
- B. **Backfill excavations as promptly as work permits, but not until completion of the following:**
 - 1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - 2. Inspection, testing, approval, and recording locations of underground utilities.
 - 3. Removal of concrete formwork.
 - 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
 - 5. Removal of trash and debris.
 - 6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
- C. **Ground Surface Preparation:** Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface to a minimum of 6" depth prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
 - 1. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- D. **Placement and Compaction:** Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.
 - 1. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

3.5 PAVEMENT SUBBASE COURSE

- A. Placing Site Mixed Materials: When a compacted sub-base course is to be 6 inches thick or less, place material in a single layer. When indicated to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.
- B. Soil-Lime Stabilization: Scarify and pulverize the top section of the area scheduled for soil-lime stabilization. Use motorized mechanical processor equipment. Site mix subsoil to achieve mix conditions and formulations for required stabilization. Place mix materials in continuous layers, uniformly spread over the surface. No equipment, except that used in spreading, shall be allowed to pass over the freshly spread cement/lime until it is mixed with the soil.
 1. The lime, soil, and water shall be thoroughly mixed by the use of a mixing machine that will satisfactorily mix the materials and shall be capable of producing satisfactory results. All equipment used shall be capable of excavating subsoil, mixing and placing materials, wetting and sprinkling, consolidation, and compaction of materials to meet the specified requirements.
- C. Commence compaction operations immediately upon completion of mixing operations. Compaction shall continue until the entire depth of the soil lime mixture is uniformly compacted to the specified density.
- D. At any time construction is stopped, a transverse construction joint shall be formed by cutting back vertically into the completed soil-lime base. The material in front of the joint shall be prepared for processing in the next day's work.
- E. Upon completion of smooth rolling of the final lift, the base shall be kept protected against rapid drying for a period of 72 hours by flooding with water or at Contractor's option, provision of a curing seal. All traffic shall be kept off of base material during curing period.
- F. Thickness of soil-lime subbase shall remain as indicated on the Drawings.

3.6 DRAINAGE COURSE

- A. Under concrete pavement, install drainage fabric on prepared subbase according to manufacturer's written instructions, overlapping sides and ends.

3.7 PAVEMENT BASE COURSE

- A. General: Place base material, in layers of specified thickness, over subgrade surface and drainage fabric to support pavement. Compact to specified density.
 1. Refer to other Division 2 sections for paving specifications.
- B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of base course.
- C. Shoulders: Place shoulders along edges of base course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each base course layer. Compact and roll at least a 12-inch width of shoulder simultaneously with the compaction and rolling of each layer of base course.
- D. Compact aggregate base course (where applicable) to indicated density.

3.8 GRADING

- A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.
- B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.
- C. Finish surfaces free from irregular surface changes, and as follows:
 - 1. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than $\frac{1}{4}$ " above or below required subgrade elevation.
- D. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of $\frac{1}{2}$ " when tested with a 10' straightedge.
- E. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.9 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.
 - 1. Perform field density tests in accordance with ASTM standards.
 - 2. Verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Architect/Engineer.
- B. Paved Areas and Building Slab Subgrade: Make at least three tests.

3.10 MAINTENANCE

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
 - 1. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.
- C. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal to Designated Areas on Owner's Property: Transport acceptable excess excavated material to designated soil storage areas on Owner's property. Stockpile soil or spread as directed by Architect/Engineer.
- B. Transport waste material, including unacceptable excavated material, trash and debris away from Owner's property and legally dispose of as required.

END OF SECTION 31 20 00

Section 32 13 00 - Concrete Paving

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes exterior portland cement concrete paving for the following:
 - 1. Pavement and Drives
 - 2. Curbs.
 - 3. Walkways.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 31 Section "Earthwork" for subgrade preparation and grading.
 - 2. Division 31 Section "Base Materials for Concrete Pavement" for base material options beneath Portland Cement Concrete Paving.
 - 3. Division 32 Section "Concrete Pavement Joint Sealants" for joint fillers and sealants within concrete paving and at joints with adjacent construction.

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, and others if requested by Architect.
- C. Design mixes for each class of concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 QUALITY ASSURANCE

- A. Concrete Standards: Comply with provisions of following standards, except where more stringent requirements are indicated.
 - 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 - 2. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- C. Each truck sent from the Ready-mix Plant to the Job site shall have a delivery ticket containing at least the following information:
 - 1. Name of Ready-mix Plant and serial number of ticket.
 - 2. Date and truck number.
 - 3. Name of Job and Contractor.
 - 4. Number of sacks of cement per cubic yard.

5. Amount of concrete.
6. Time of day truck was loaded.
7. Any truck without a proper ticket shall be subject to rejection.

D. Concrete Testing Services: Comply with requirements indicated of applicable Division 3 Concrete sections.

1.5 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1. Coordinate with requirements for "Temporary Facilities" specified in Division 1.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

1. Use flexible spring steel forms or laminated boards to form radius bends as required.

B. Metal Keyways: Galvanized steel, 24 gage tongue and groove joint, with punch-out for dowel holes. Provide size as required for depths of site pavement indicated, complete with 16 gauge tapered channel stake pins. Provide plastic top cap strip capable of removal after placement of concrete, where indicated, for placement of horizontal joint sealant.

C. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 REINFORCEMENT MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Welded Steel Wire Fabric: ASTM A 185.

1. Furnish in flat sheets, not rolls, unless otherwise acceptable to Architect.

C. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

D. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place.

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I.

1. Use one brand of cement throughout Project unless otherwise acceptable to Architect.

B. Fly Ash: Not permitted.

- C. Normal-Weight Aggregates: ASTM C 33, Class 4, and as follows. Provide aggregates from a single source.
 - 1. Maximum Aggregate Size: 1-1/2 inches.
 - 2. Do not use fine or coarse aggregates that contain substances that cause spalling.
 - 3. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.
- D. Water: Potable.

2.4 ADMIXTURES

- A. Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- C. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

2.5 CURING MATERIALS

- A. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B.
 - 1. Provide material that has a maximum volatile organic compound (VOC) rating of 350 g/L.

2.6 RELATED MATERIALS

- A. Epoxy Bonding Adhesive: ASTM C 881, two component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 - 1. Type: Class IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- B. Expansion Joint Materials: Comply with requirements of applicable Division 7 Sections for preformed expansion joint fillers and sealers.
- C. PVC Pipe: ASTM D 3034, SDI 35.
- D. Geotextile Drainage Fabric: Nonwoven, geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; with a minimum weight of 8 ounces per square yard.

2.7 CONCRETE MIX

- A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use a qualified independent testing agency for preparing and reporting proposed mix designs.
 - 1. Do not use the Owner's field quality-control testing agency as the independent testing agency.

- B. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
1. Driveways, Parking Areas, and Roadways:
 - a. Minimum Cement Content: 5.5 sacks per cubic yard.
 - b. Compressive Strength (28-Day): 4000 psi (27.6 MPa).
 2. Sidewalks, Walkways, and Pads:
 - a. Minimum Cement Content: 5.0 sacks per cubic yard.
 - b. Compressive Strength (28-Day): 3000 psi (20.7 MPa).
 3. Maximum Water-Cement Ratio at Point of Placement: 0.45.
 4. Slump Limit at Point of Placement: 5 inches.
 - a. Slump limit for concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows with a tolerance of plus or minus 1-1/2 percent:
1. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.
1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Proof-roll prepared base surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.
- B. Remove loose material from compacted base surface immediately before placing concrete.

3.1 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

- B. Check completed formwork and screeds for grade and alignment to following tolerances:
 - 1. Top of Forms: Not more than 1/8 inch in 10 feet.
 - 2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.
- C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.2 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.3 JOINTS

- A. General: Construct contraction, construction, and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline, unless indicated otherwise.
 - 1. Provide two foot wide continuous strip of nonwoven geotextile fabric beneath all construction and expansion joint locations.
- B. Contraction Joints: Provide weakened-plane contraction joints, sectioning concrete into areas as shown on Drawings. Construct contraction joints for a depth equal to at least 1/4 of the concrete thickness, as follows:
 - 1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool.
 - 2. Inserts: Form contraction joints by inserting premolded plastic strips to top surface of metal keyway joint materials so that top of strip will be flush with finished surface of paving surface. Carefully remove strips or caps of assemblies after concrete has hardened to avoid spalling of edges. Clean groove of loose debris.
- C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than 1/2 hour, unless paving terminates at isolation joints.
 - 1. Provide preformed galvanized steel section forms or bulkhead forms with keys, unless indicated otherwise. Embed keys at least 1-1/2 inches into concrete.
 - 2. Continue reinforcement across construction joints unless indicated otherwise.
 - 3. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
 - a. Where load transfer-slip dowel devices are used, install so that one end of each dowel bar is free to move. Assure that dowels are aligned horizontally and vertically plumb prior to and during concrete placement operations.
 - 1) Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one half of dowel length to prevent concrete bonding to one side of joint.

- D. Expansion Joints: Form expansion joints of preformed joint filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at intervals indicated on Drawings but in no case exceed 50 feet at sidewalks.
 2. Extend joint fillers full width and depth of joint, not less than ½ inch or more than 1 inch below finished surface where joint sealant is indicated. Place top of joint filler flush with finished concrete surface when no joint sealant is required.
 3. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.
 4. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Carefully remove protective cap after concrete has been placed on both sides of joint to avoid spalling.
- E. Installation of joint fillers and sealants is specified in Division 7 Section "Joint Sealants."

3.4 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.
- C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- D. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.
- E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
1. When concrete placing is interrupted for more than ½ hour, place a construction joint.
- F. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R.
1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcing, dowels, and joint devices.
- H. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.
- I. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- J. Cold-Weather Placement: Concrete placement shall not be allowed when air temperature has fallen or is expected to fall below 40 deg F (4 deg C).
- K. Hot-Weather Placement: Place concrete complying with ACI 305R and as specified when hot weather conditions exist.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

L. Tolerances: Comply with tolerances of ACI 117.

3.5 RAMP CONSTRUCTION

A. General: Concrete ramps at pavement areas as indicated on drawings are required by provisions of the Americans With Disabilities Act. The requirements of the Act are very explicit and it is suggested that the Contractor review the applicable provisions. Certain features of the Act affecting concrete ramp construction are enumerated herein and indicated on the Drawings, however additional requirements may be indicated in the Act.

1. Minimum width: 60 inches.
2. Cross slope: Less than 1:50.
3. Changes in Level: Changes in level at any point shall not exceed 1/4 inch.
 - a. If changes in level must be greater than 1/4 inch then the maximum change in elevation shall be 1/2 inch. Changes in level between 1/4 inch and 1/2 inch shall require a beveled transition and shall not have a slope greater than 1:2.
 - b. If changes in level are in excess of 1/2 inch a ramp shall be required and shall not exceed a slope of 1:12.

B. Curb Ramps: Slopes of curb ramps shall not exceed a 1:12 slope for the center transition area and a maximum of 1:10 slopes for the side flares. Projections in excess of 1/4 inch shall be sufficient cause for rejection of entire ramp.

1. Minimum Width: The minimum clear width of a curb ramp transition area shall be 36 inches.
2. Maximum Rise: Ramps shall not rise more than 30 inches without the provision for intermediate landings.

C. Landings: The ramp shall have a level landing at the bottom and the top of the ramp run and shall have the following features:

1. Width: At least as wide as the ramp run leading to it.
2. Length: Minimum 60 inches clear.
3. Landing size at changes in direction: Minimum 60 inch by 60 inch.

D. Tactile Warning Areas: At areas where tactile warning surfaces are indicated or required, provide a surface profile with minimum 1/4" deep grooves that are spaced 2" to 3" on center and scored into the concrete.

1. Provide integrally colored concrete of contrasting color to adjacent areas at these locations.
 - a. Color shall be as selected by Architect.

3.6 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

- B. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.
 - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across concrete surface perpendicular to line of traffic to provide a uniform fine line texture finish.
 - 2. Heavy Textured Broom Finish (Ramp Areas): Provide a coarse finish by striating 1/16 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
- C. Final Tooling: Tool edges of paving, gutters, curbs, and joints formed in fresh concrete with a jointing tool to the following radius. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.
 - 1. Radius: 1/4 inch.

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.
- B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by curing compound as follows:
 - 1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 FIELD QUALITY CONTROL TESTING

- A. The Owner will employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:
 - 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of placement for each compressive-strength test but no less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 - b. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test but no less than one test for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 45 deg F (7 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.

- d. Compression Test Specimens: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless directed otherwise. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - 1) Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. Test one specimen at 7 days, test two specimens at 28 days, and retain one specimen in reserve for later testing if required.
- B. Test results will be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in paving, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.
 - 1. Any cylinder which does not comply in every respect with these specifications shall not be paid by for by the Owner.
 - 2. If any material is found not to comply with these specifications, the testing laboratory shall immediately notify the Contractor that the material is rejected. If the Contractor persists in placing the rejected material into the work, the testing laboratory shall immediately notify the Architect. if a rejected batch of concrete is poured by the Contractor, the testing laboratory shall obtain a set of cylinders from the rejected batch. If the Contractor fails to cooperate with the testing laboratory, circumvents or ignores the specified testing program, the testing laboratory shall immediately notify the Architect.
- C. If the Contractor fails to notify the testing Laboratory of a scheduled pour and as a result no cylinders are taken, the Contractor shall bear the cost of verifying that the in-place concrete meets the strength requirements of the specifications. Cores shall be extracted and tested from the cast-in-place concrete in accordance with ASTM C 42. Location of cores shall be determined by the Architect.
- D. Additional Tests: The testing agency will make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.
 - 1. Costs for additional testing will be borne by the Contractor.

3.9 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section.
- B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 00

Section 32 13 73 - Concrete Paving Joint Sealants

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Expansion and contraction joints within cement concrete pavement.
- B. Related Sections include the following:
 - 1. Division 7 Section "Joint Sealants" for expansion joint filler material and for sealing non-traffic and traffic joints in locations not specified in this Section.
 - 2. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples in ½-inch- wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, and curing time.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet or covered with frost.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 COLD-APPLIED JOINT SEALANTS

- A. Contractor shall have the option to use either of the following products:
 - 1. Multi-component Urethane Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, and uses indicated.
 - a. Urethane Formulation: Type M; Grade P; Class 12-1/2; Uses T, M, and, as applicable to joint substrates indicated, O.
 - 1) Product:
 - a) Pecora Corporation; Urexpan NR-300.
 - b. Bitumen-Modified Urethane Formulation: Type M, Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
 - 1) Product:
 - a) Tremco Sealant/Waterproofing Division; Vulkem 202.
 - 2. Single-component Urethane Sealant for Concrete: Single component, pourable, coal-tar-modified, urethane formulation complying with ASTM C 920 for Type S, Grade P, Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
 - a. Product:
 - 1) Sonneborn, Div. Of ChemRex, Inc; Sonomeric 1.

2.4 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.5 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of backer materials.
 - 2. Do not stretch, twist, puncture, or tear backer materials.
 - 3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses provided for each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.
- G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 32 13 73

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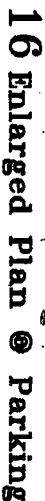
Construction Documents

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KEY PLAY

Construction Documents



8 Enlarged Plan @ Patio Stairs



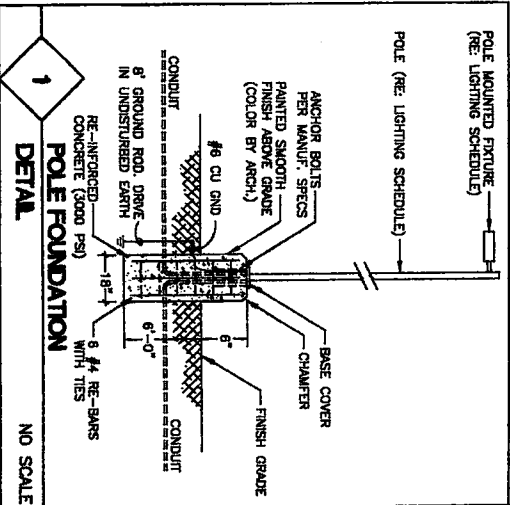
Paving Legend

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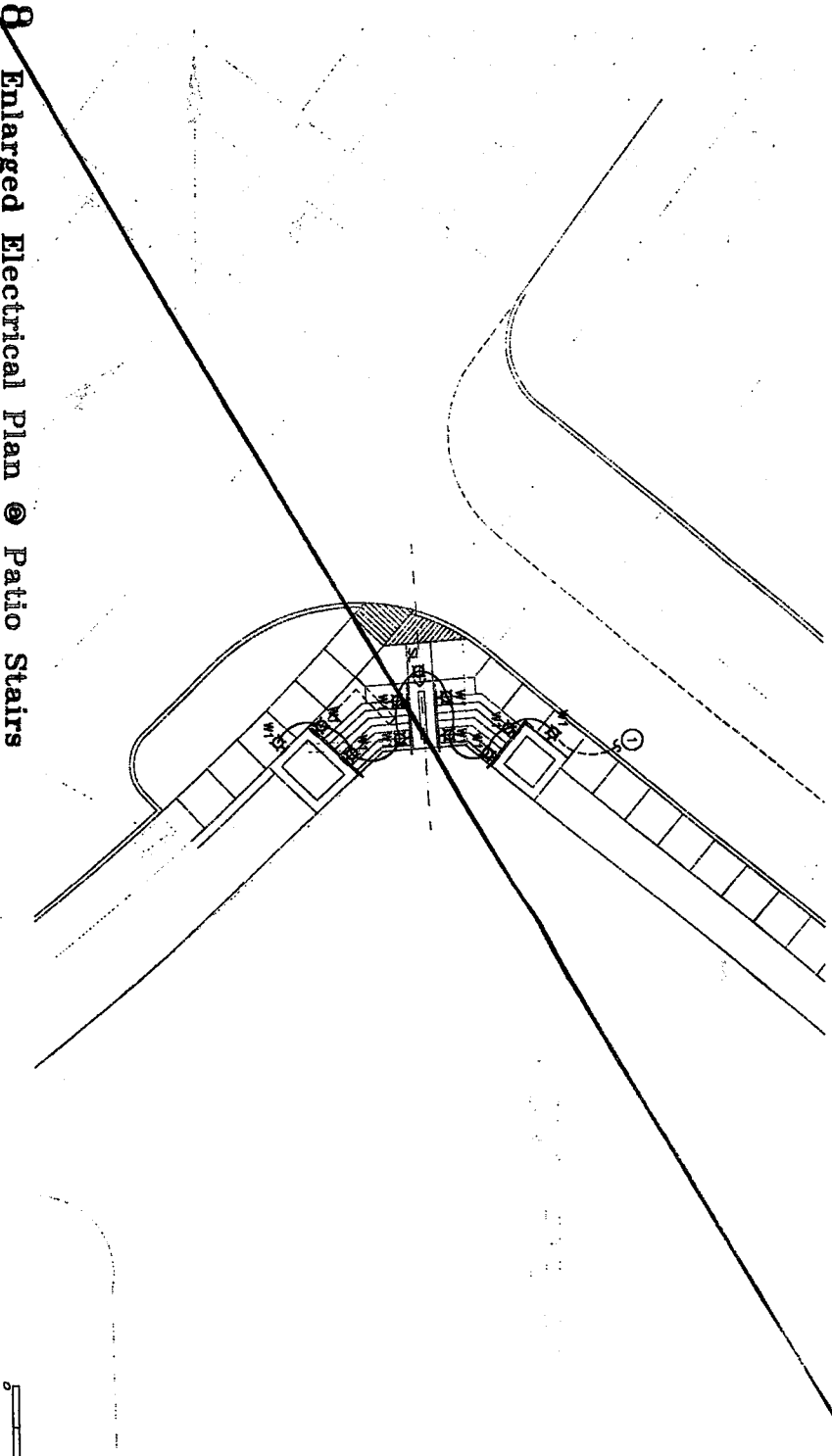
KEYNOTE EXPLANATION

ELECTRICAL NOTES:

- ① CIRCUIT LIGHTING VIA 3/16 IN 1" CONDUIT TO A 20/1 CIRCUIT BREAKER IN PANEL "1" PROVIDE CIRCUIT BREAKER. SWITCH VIA LIGHTING CONTACTOR.
- ② THE LIGHTING TO NEAREST EXISTING SITE LIGHTING CIRCUIT.



~~8~~ Enlarged Electrical Plan @ Patio Stairs

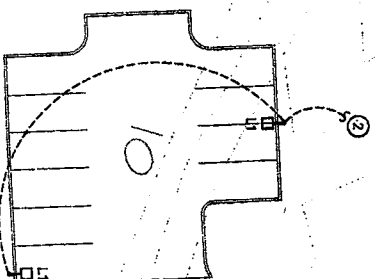


LIGHTING FIXTURE SCHEDULE

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NOTES

- 1) ALL FLUORESCENT LAMPS : 3500° KELVIN COLOR TEMPERATURE, 75 CM MINIMUM,
2) ALL METAL HALIDE LAMPS : 3600° KELVIN COLOR TEMPERATURE, 75 CM MINIMUM,
3) IT IS THE MANUFACTURER'S RESPONSIBILITY TO PROVIDE EQUIVALENT PARTURES TO THOSE SPECIFIED. PRIOR APPROVAL IS NOT REQUIRED UNLESS NOTED
4) CIRCUIT EMERGENCY BATTERY PACKS AHEAD OF SWITCH ON ALL SWITCHED CIRCUITS.



16 Enlarged Electrical Plan @ Parking

Construction Documents

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